Cambridge International AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

BIOLOGY **9700/35**

Paper 3 Advanced Practical Skills 1 **October/November 2017**

2 hours

Candidates answer on the Question Paper.

Additional Materials: As listed in the Confidential Instructions.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paperclips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

For Examiner's Use	
1	
2	
Total	

This document consists of **12** printed pages and **4** blank pages.

Before you proceed, read carefully through the **whole** of Question 1 and Question 2.

Plan the use of the **two hours** to make sure that you finish all the work that you would like to do.

If you have enough time, think about how you can improve the accuracy of your results, for example by obtaining and recording one or more additional measurements.

You will **gain marks** for recording your results according to the instructions.

1 In humans, the kidneys are the organs that remove waste products from the blood and produce urine. Small, useful molecules such as glucose are also removed from the blood in the kidney. Glucose must be reabsorbed into the blood so that very little is lost in the urine.

The concentration of glucose in urine can be estimated in order to check that the kidneys are working.

You will not be testing real urine. You will be testing solutions that represent urine and will be referred to as 'mock urine'.

You are required to test each of three samples of mock urine for the presence of glucose. These represent samples taken at different times from the same person.

You are provided with:

labelled	contents	hazard	volume / cm^3
U1	mock urine	none	20
U2	mock urine	none	20
U3	mock urine	none	20
Benedict's	Benedict's solution	none	20
G	2% glucose solution	none	20
W	distilled water	none	20

If **Benedict's** comes into contact with your skin, wash off immediately under cold water.
It is recommended that you wear suitable eye protection.

Read step 1 to step 7 before proceeding.

Proceed as follows:

1. Set up a water-bath and heat to boiling for use in step 6.
2. Put 2 cm^3 of **U1** into a test-tube.
3. Put 2 cm^3 of Benedict's solution into the same test-tube.
4. Shake the test-tube gently to mix the contents.
5. Repeat step 2 to step 4 for **U2** and **U3**.
6. Put all three test-tubes into the water-bath you prepared in step 1 and immediately start timing.
7. Record in **(a)(i)** the time taken to the first colour change **and** record the final colour at 90 s. After 90 s, remove each of the test-tubes from the water-bath.

   If there has been no colour change during the 90 s, record the time to the first colour change as 'more than 90'. You should still record the final colour at 90 s.

(a) (i) Record your results in an appropriate table.

[4]

(ii) Use your results in **(a)(i)** to state which of **U1**, **U2**, and **U3** do **not** contain glucose.

.....[1]

(iii) State how you will use your results in **(a)(i)** to identify which of **U1**, **U2**, and **U3** has the highest concentration of glucose.

.....

.....[1]

(iv) State which of **U1**, **U2**, and **U3** has the highest concentration of glucose. .....[1]

[Turn over

If the sample with the highest concentration of glucose is more than 0.5%, then this may mean that a kidney is not working.

You are required to estimate the concentration of glucose in the sample stated in **(a)(iv)** by:

- preparing 10 cm^3 of a 0.5% glucose solution
- carrying out a Benedict's test on the 0.5% glucose solution
- using your results to estimate the concentration of glucose in the sample stated in **(a)(iv)**.

(v) You are provided with a 2% glucose solution, **G**.
Complete Table 1.1 to describe how **G** could be diluted to produce 10 cm^3 of a 0.5% glucose solution.

Table 1.1

final percentage concentration of glucose	volume of 2% glucose solution / cm^3	volume of distilled water, **W** / cm^3
0.5		

[2]

(vi) State **one** variable that must be standardised when carrying out the Benedict's test, to allow you to make a valid comparison between the results collected in **(a)(i)** and the result you will collect for the 0.5% glucose solution you have prepared.

.....

.....

.....[1]

8. Prepare the 0.5% glucose solution as shown in Table 1.1 in the beaker provided.

9. Repeat the Benedict's test with the 0.5% glucose solution and the sample stated in **(a)(iv)**.

10. Record in **(a)(vii)** the time taken to the first colour change. After 90 s, remove the test-tubes from the water-bath.
If there has been no colour change during the 90 s record the time to the first colour change as 'more than 90'.

(vii) Record your results in an appropriate table.

[2]

(viii) Use your results from **(a)(vii)** to complete Table 1.2 by using **one** tick (✓) to show your estimate of the concentration of glucose in the sample stated in **(a)(iv)**.

Table 1.2

percentage concentration of glucose in mock urine sample	estimate tick (✓)
below 0.5	
0.5	
above 0.5	

[1]

(ix) This procedure enabled you to estimate the concentration of glucose in the mock urine sample.

Suggest how you would improve this procedure to find a more accurate estimate of this concentration.

.....

.....

.....

.....

.....

.....[3]

Question 1 continues on page 6

(b) Fig. 1.1 is a photomicrograph of a stained transverse section through an animal organ. This organ is used to transport urine from the kidney to the bladder.

You are not expected to be familiar with this specimen.

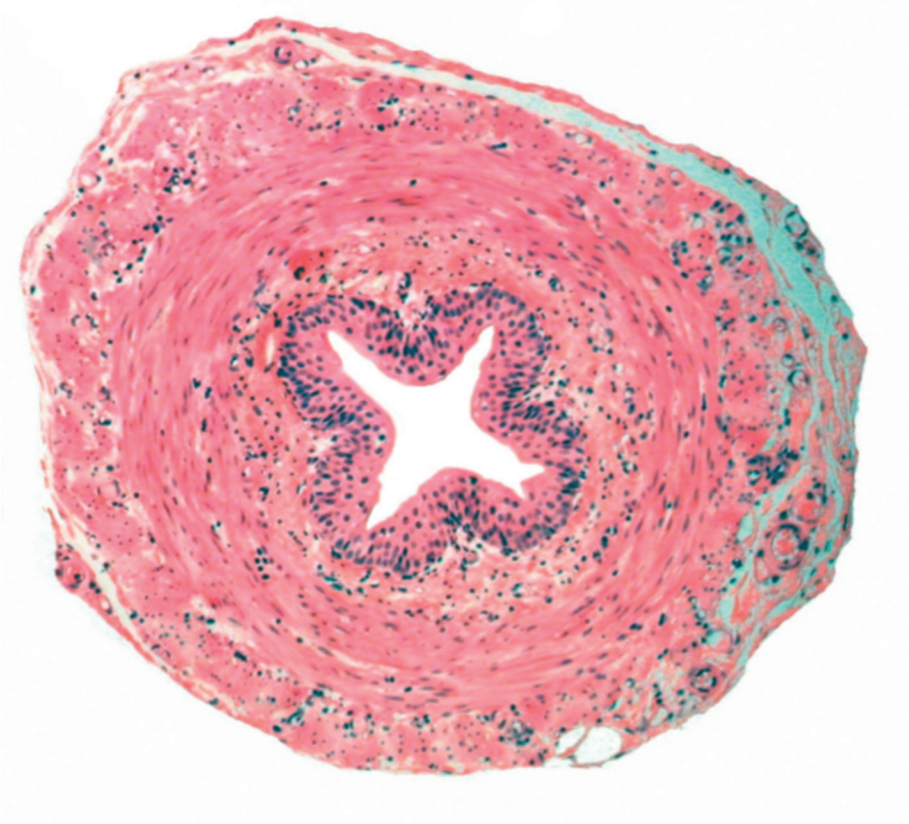

Fig. 1.1

Use a sharp pencil for drawing.

Draw a large plan diagram of half of the organ in Fig. 1.1, shown by the shaded area in Fig. 1.2.

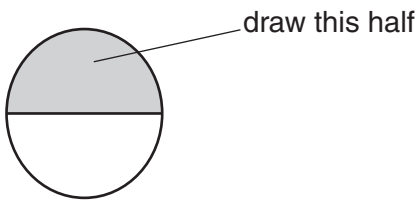

Fig. 1.2

You are expected to draw the correct shape and proportions of the different tissues.

[4]

[Total: 20]

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2 **K1** is a slide of a stained transverse section through a plant leaf.

You are not expected to be familiar with this specimen.

Use a sharp pencil for drawing.

(a) Observe the upper epidermis of the leaf on **K1**. The upper epidermis has no guard cells.

Select one group of **four** adjacent (touching) cells from the upper epidermis.
Each cell must touch at least one of the other cells.

Make a large drawing of this group of **four** cells.

Use **one** ruled label line and the label **C** to identify a structure made of cellulose.

[5]

(b) A scientist investigated the rate of transpiration from the leaves of a plant adapted to growing in a dry, hot habitat.

The rate of transpiration was measured in arbitrary units (au) and recorded at intervals from 08:00 to 17:00.

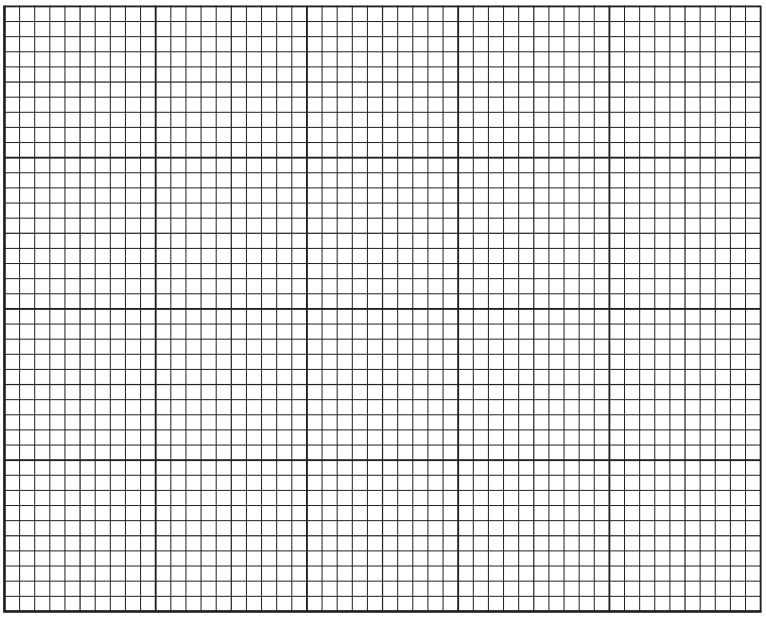
The results are shown in Table 2.1.

Table 2.1

time of day	mean rate of transpiration / au
08:00	0.30
10:30	1.00
12:00	1.55
15:30	1.15
17:00	0.40

Use a sharp pencil for drawing graphs.

(i) Plot a graph of the data shown in Table 2.1.



[4]

(ii) Calculate the difference in the mean rate of transpiration between 08:30 and 11:30. Show your working.

difference = ...[2]

(iii) Suggest an explanation for the difference in the mean rates of transpiration between 08:30 and 11:30.

.....

.....

.....

.....

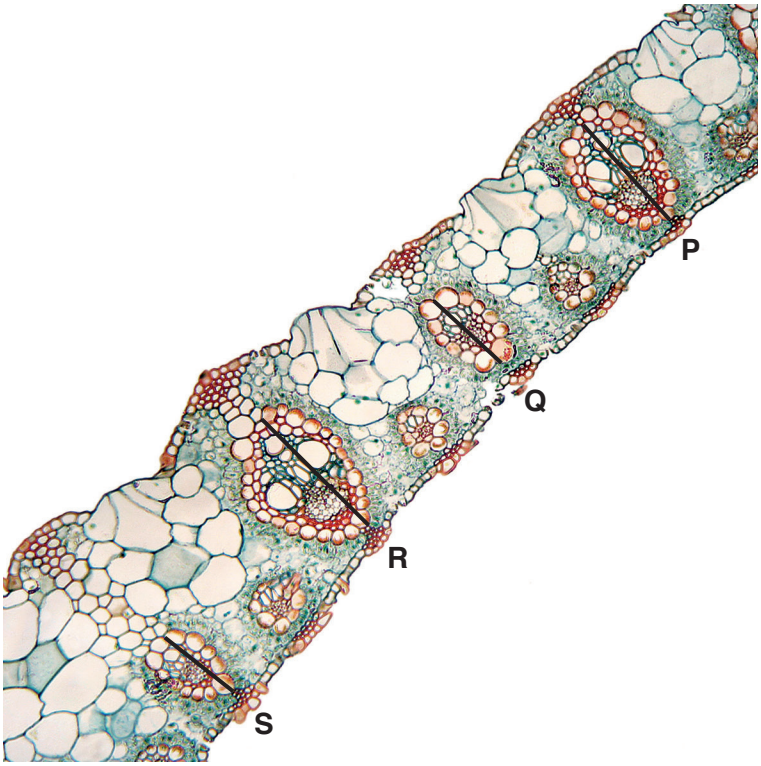
.....

.....

.....[3]

(c) Fig. 2.1 is a photomicrograph of a stained transverse section through part of a plant leaf from a different type of plant.

You are not expected to be familiar with this specimen.



magnification ×59

Fig. 2.1

(i) In Fig. 2.1 the lines **P**, **Q**, **R** and **S** are drawn across the length of four vascular bundles.

Use the lines **P**, **Q**, **R** and **S** and the magnification to find the actual length of each of the vascular bundles in μm.

You may lose marks if you do not show your working.

P..... μm, **Q**..... μm, **R**..... μm, **S**..... μm [2]

(ii) Using the actual lengths in **(c)(i)**, calculate the **mean** actual length of these four vascular bundles.

You may lose marks if you do not show your working or if you do not use appropriate units.

mean actual length = ... μm [2]

(d) Observe the leaf on **K1** and the leaf in Fig. 2.1 and identify the differences between them.

Record the observable differences in Table 2.2.

Table 2.2

feature	K1	Fig. 2.1

[2]

[Total: 20]

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